

Date: Thursday, 3/22/2007 7:46:27 AM  
 User: Kim Johnston

## Process Sheet

Customer : CU-DAR001 Dart Helicopters Services	Drawing Name : X-TUBE 412
Job Number : 31434	
Estimate Number : 12783	
P.O. Number : <i>N/A</i>	Part Number : D412664145
This Issue : 3/22/2007 S.O. No. : <i>N/A</i>	Drawing Number : D412-664-145 U/R
Prsht Rev. : NC	Project Number : N/A
First Issue : <i>NA</i> Type : LANDING GEAR	Drawing Revision : U/R
Previous Run : 31152	Material : <i>N/A</i>
Written By : <i>[Signature]</i>	Due Date : 3/29/2007 Qty: 1 Um: Each
Checked & Approved By : <i>[Signature]</i> 07.03.22	
Comment : Est Rev:A New Issue 07-02-14 JLM	

## Additional Product

Job Number:



Seq. #:	Machine Or Operation:	Description :
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1.0	DC	DOCUMENT CONTROL
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Comment: Photocopy bluefile & type labels per PPPD412-664-105	CHG 001
---	---------

2.0	D6019128	Crosstube Material
-----	----------	--------------------



Comment: Qty.: 1.0000 Each(s)/Unit Total : 1.0000 Each(s)
---

Pick:

Qty Part number Description Batch

1 D6019-128 Crosstube *29369*Check OD = 2.7500"; ID = *2.125"* *07.03.22**MS 07/03/22*

3.0	MORI SEIKI	MORI SEIKI CNC LATHE LARGE
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Comment: MORI SEIKI CNC LATHE LARGE
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Turn as per Dwg D412-664-145

*MS 07/03/22*

4.0	QC2	INSPECT PARTS AS THEY COME OFF MACHINE
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Comment: INSPECT PARTS AS THEY COME OFF MACHINE
---

*MS 07/03/22*

5.0	QC8	SECOND CHECK
-----	-----	--------------



Comment: SECOND CHECK
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*MS 07/03/27*

6.0	LANDING GEAR 1	LANDING GEAR RESOURCE 1
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Comment: LANDING GEAR RESOURCE 1
----------------------------------

1-Polish entire outside surface of crosstube

*Job 7-4-4*

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

Date: Thursday, 3/22/2007 7:46:27 AM  
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## Process Sheet

Customer: CU-DAR001 Dart Helicopters Services

Drawing Name: X-TUBE 412

Job Number: 31434

Part Number: D412664145

Job Number:



Seq. #

Machine Or Operation:

Description :

7.0

QC5

INSPECT WORK TO CURRENT STEP



Comment: INSPECT WORK TO CURRENT STEP

DP 7-4-4

8.0

HAND FINISHING1

HAND FINISHING RESOURCE #1



Comment: HAND FINISHING RESOURCE #1

Chemical Conversion Coat as per QSI 005 4.1

JD 7-4-4

9.0

QC3/5

INSPECT WORK/WING WALK



Comment: Inspect work & Chemical conversion Coat

DP 7-4-4

10.0

BENDING

BENDING MACHINE



Comment: BENDING MACHINE

Bend tube as per Dwg D412-664-145 using CNC bender program

EL 7-4-4

11.0

QC5

DIMENSIONAL CHECK



Comment: DIMENSIONAL CHECK

270412 (V)

12.0

LANDING GEAR 1

LANDING GEAR RESOURCE 1



Comment: LANDING GEAR RESOURCE 1

1-Drill pilot holes in tube as per Dwg D412-664-245

2-Ream hole to finish size in tube as per Dwg D412-664-245

3-Deburr & Inspect for surface damage. Repair damage within limits as per Dwg D412-664-245

85 07-04-24

JD 7-4-24

13.0

HAND FINISHING1

HAND FINISHING RESOURCE #1



Comment: HAND FINISHING RESOURCE #1

Chemical Conversion Coat Tube as per QSI 005 4.1

JD 7-4-24

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
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## Process Sheet

Customer: CU-DAR001 Dart Helicopters Services

Drawing Name: X-TUBE 412

Job Number: 31434

Part Number: D412664145

Job Number:



Seq. #:

Machine Or Operation:

Description :

14.0

QC3

INSPECT POWDER COAT/CHEMICAL CONVERSION



Comment: INSPECT POWDER COAT/CHEMICAL CONVERSION

*20704.25*

15.0

QC5

INSPECT WORK TO CURRENT STEP



Comment: INSPECT WORK TO CURRENT STEP

*20704.25*

16.0

OUTSIDE SERVICE

OUTSIDE SERVICES



Comment: Sub-Contracting OUTSIDE SERVICES

Liquid Penetrant Inspection as per QSI 038Or

Issue P/O: 3644 LPI as per ASTM 1417

Level 2 Attach copy of NDT results to work order

*C207104/24 ①*

17.0

PACKAGING 1

PACKAGING RESOURCE #1



Comment: PACKAGING RESOURCE #1

Inspect for transit damage

Ensure copy of NDT results attached to work order.

*C207105/01*

18.0

QC5

INSPECT WORK TO CURRENT STEP



Comment: Inspect for damage & ensure results are as per Dwg D412-664-203

*2070501 ①*

19.0

SPRAY PAINTING

SPRAY PAINTING



Comment: SPRAY PAINTING

1-Prime inside and outside crosstube as per QSI 005 4.2

2-Paint outside crosstube with White Imron as per QSI 005 4.2

*2070502*

20.0

QC14

Inspect Spray Paint



Comment: Inspect Spray Paint

Wrap in plastic bag to protect from scratches

*2070503 ①*



# Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector
070502	18.	No NDT results came back, waiting for Heat Aiv. continue to step 27, - not 28. Tube was accepted at NDT rec'd 070504 11:30					

Part No: 11 PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_  
 QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

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Customer: CU-DAR001 Dart Helicopters Services

Drawing Name: X-TUBE 412

Job Number: 31434

Part Number: D412664145

Job Number:



Seq. #:

Machine Or Operation:

Description :

21.0

D31893

Chafing Shield



Comment: Qty.: 1.0000 Each(s)/Unit Total : 1.0000 Each(s)

Chafing Shield

Batch: 31959

RT 07 05 04

22.0

D3595

Rubber Cushion (per sq ft)



Comment: Qty.: 0.0798 sf(s)/Unit Total : 0.0798 sf(s)

Rubber Cushion

Cut to .630" X 4.4" X 4 PCS

Batch: 31948

RT 07 05 04

23.0

D28931

Support



Comment: Qty.: 2.0000 Each(s)/Unit Total : 2.0000 Each(s)

Pick:

Qty Part number Description Batch

2 D2893-1

Support

27475

RT 07-05-04

24.0

D2856600

Abrasion Strip



Comment: Qty.: 0.9450 f(s)/Unit Total : 0.9450 f(s)

Abrasion Strip

1X D2856 .250" X 8.42"

Batch: 26650

RT 07-05-04

25.0

MS2192024

Clamp(per MIL-DTL-8783C)



Comment: Qty.: 2.0000 Each(s)/Unit Total : 2.0000 Each(s)

Pick:

Qty Part number Description Batch

2 MS21920-24

Clamp

103002

RT 07-05-04

26.0

MS2192024

Clamp(per MIL-DTL-8783C)



Comment: Qty.: 4.0000 Each(s)/Unit Total : 4.0000 Each(s)

clamp(per MIL-DTL-8783C)

batch: M103002

RT 07 05 04

# Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes ☐ No ☒ DQA: ☒ Date: 07/05/04  
 QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries



Date: Thursday, 3/22/2007 7:46:27 AM  
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## Process Sheet

Customer: CU-DAR001 Dart Helicopters Services

Drawing Name: X-TUBE 412

Job Number: 31434

Part Number: D412664145

Job Number:



Seq. #:

Machine Or Operation:

Description :

27.0

LANDING GEAR 1

LANDING GEAR RESOURCE 1



Comment: LANDING GEAR RESOURCE 1  
Assemble as per Dwg D412-664-145

Install Chaffing Sheild

Instal supports with magnobond 6398 per dwg D412-664-245,  
cure for 12hrs before packaging.

Time & date of application:

Batch:

12:00  
07 05 03  
M103628

07 05 03

28.0

QC5

INSPECT WORK TO CURRENT STEP



Comment: INSPECT WORK TO CURRENT STEP

29.0

PACKAGING 1

PACKAGING RESOURCE #1



Comment: PACKAGING RESOURCE #1

Identify and pack for shipping as per PPP D412-664-105

\*\*\*\*\*Ensure tube is not packaged if curing time is less than 12 hrs, see step 26 for application time & date  
\*\*\*\*\*

Time & date of packaging:

Location:

PPP Rev:

07-05-04 12:30  
PPP 32107 SQ

POSITIVE RECALL

EFFECTIVE 07.03.22 AUTH

RELEASED

DATE

07-05-04  
2/5/24

30.0

QC21

FINAL INSPECTION/W/O RELEASE



Comment: FINAL INSPECTION/W/O RELEASE

Job Completion



W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries

**DART**

DESIGN <i>QP</i>	DRAWN BY <i>QP</i>	<b>DART AEROSPACE LTD</b> HAWKESBURY, ONTARIO, CANADA	
CHECKED <i>A</i>	APPROVED <i>A</i>	DRAWING NO. D412-664-145	REV. B SHEET 1 OF 3
DATE 07.03.01		TITLE CROSSTUBE ASS'Y (412 LOW-N FWD) NTS	
A	06.12.21	NEW ISSUE	
B	07.03.01	CHG RUBBER CUSHION	

**PRELIMINARY ISSUE****PARTS LIST:**

Qty	Part Number	Description
X	D412-664-145	CROSSTUBE ASSEMBLY (412 LOW-NARROW FWD)
1	D6019-128	CROSSTUBE
1	D2856-250-842	ABRASION STRIP
2	D2893-1	SUPPORT
1	D3189-3	CHAFING SHIELD
4	D3595-063-440	RUBBER CUSHION
2	MS21920-22	CLAMP
4	MS21920-24	CLAMP
A/R	MAGNOBOND 6398	ROCKWELL SPECIFICATION RBO-120-023 ADHESIVE (TEXTRON/BELL SPEC. 299-947-100, TYPE II, CLASS 2 ADHESIVE)

**GENERAL NOTES:**

- 1) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
- 2) MATERIAL: MANUFACTURED FROM D6019-128  
FINISHED LENGTH =  $124.48 \pm 0.020$  (BEFORE BENDING/TRIMMING)
- 3) FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1  
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2  
PAINT OUTSIDE PER DART 005 4.2
- 4) PART IS SYMMETRIC ABOUT CENTERLINE, EXCEPT FOR MS21920-22 CLAMPS AND ASSOCIATED HARDWARE.
- 5) RUN-OFF PART. BLEND OUT EDGE LONGITUDINALLY, TRANSITION SHOULD BE SMOOTH.
- 6) BEND PROGRESSIVELY WITH A MINIMUM OF 8 PASSES. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 6% BASED ON O.D.
- 7) LIQUID PENETRANT INSPECT OUTSIDE SURFACE OF CROSSTUBE PER QSI 038.
- 8) SCRIBE DART PART NUMBER AND BATCH NUMBER IN THIS AREA WITH VIBRATING STYLUS.
- 9) INSTALL D2856-XXX-YYY ABRASION STRIPS WITH A 0.13 (REF) GAP ON BOTTOM SIDE OF CROSSTUBE PER QSI 035.
- 10) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE.
- 11) APPLY A 0.03" TO 0.06" THICK LAYER OF MAGNOBOND 6398 TO THE SURFACE OF D2893-1 THAT WILL BE IN CONTACT WITH THE CROSSTUBE. LET CURE FOR 12 HOURS AFTER INSTALLATION AND PRIOR TO PACKAGING.
- 12) INSTALL MS21920-24 CLAMPS WITH D3595-063-440 RUBBER CUSHIONS TO SECURE CROSSTUBE SUPPORT ON TOP SIDE OF THE CROSSTUBE. ENSURE CLAMPS ARE OPPOSITE CROSSTUBE SUPPORT.
- 13) TORQUE CLAMPS 80 TO 100 IN-LB.

UNCONTROLLED COPY  
SUBJECT TO AMENDMENT  
WITHOUT NOTICE  
WORK ORDER  
NO. 31434

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DART AEROSPACE LTD		Work Order:	
Description: (cross tube) 412 Low Narrow FWD		Part Number:	D412-664-145
Inspection Dwg: D412-664-145 Rev: B		Page 1 of 1	

### FIRST ARTICLE INSPECTION CHECKLIST

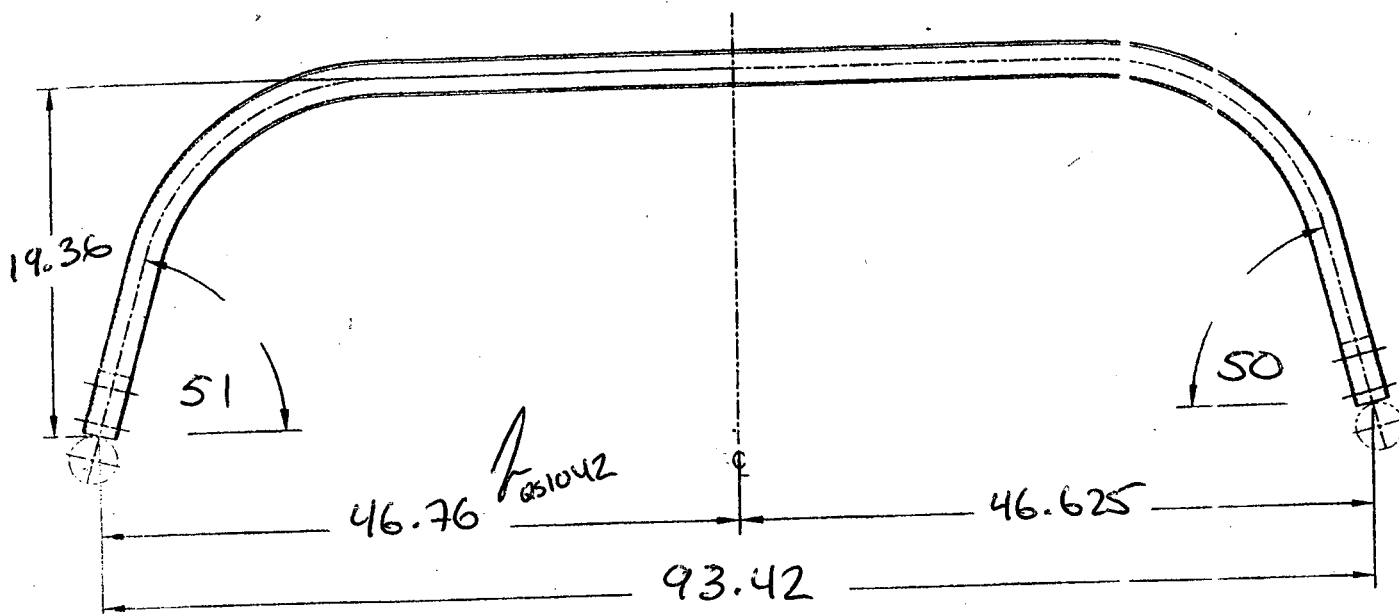
☒ First Article ☐ Prototype

Inspection Sheet	Drawing Dimension	Tolerance	Actual Dimension	Accept	Reject	Method of Inspection	Comments
A	2.740	+0.005 -0.000	2.744	✓			
B	2.490	"	2.493	✓			
C	2.557	"	2.561	✓			
D	2.624	"	2.628	✓			
E	2.692	"	2.696	✓			
F	2.750	"	2.751	✓			
G	124.48	±0.020	124.48	✓			
H							
I							
J							
K							
L							
M							
N	2.740	+0.005 -0.000	2.743	✓			
O	2.490	"	2.493	✓			
P	2.557	"	2.560	✓			
Q	2.624	"	2.628	✓			
R	2.692	"	2.696	✓			
S	2.750	"	2.751	✓			
T							
U							
V							
W							
X							
Y							

Measured by: MB	Audited by: JML	Prototype Approval:	N/A
Date: 07/03/22	Date: 07/03/27	Date:	N/A
Rev	Date	Change	Revised by
		New Issue	KJ/RF
			Approved

<b>DART AEROSPACE LTD</b>		<b>Work Order</b>	31434
<b>Description:</b> Crosstube Low Narrow Aft (412)		<b>Part Number:</b>	D412-664- <del>245</del> <sup>-145</sup>
<b>Inspection Dwg:</b> D412-664- <del>245</del> <sup>-145</sup>		<b>Rev:</b> B	Page 1 of 1

Required Dimension	Min	Max
Height	19.33	19.49
1/2 Span	46.47	46.73
Angle	49	52
Total Span	92.94	93.46



Comments

QC15 Inspection	R 0704-12
Date	

Rev	Date	Change	Revised by	Approved
A	07.03.29	New Issue	KJ/ M	<i>[Signature]</i>

**HeathAir**

INTERNATIONAL (1991) INC.

681 Ave. Lapine, Dorval, Québec H9P 1G3  
Tél.: (514) 636-1000 • Fax: (514) 636-0031

W.O. N° 36257

A.M.O. Number: 46/90

**NON-DESTRUCTIVE TESTING REPORT****AIRCRAFT / COMPONENT INFORMATION**

REGISTRATION:

MODEL/TYPE:

SERIAL NUMBER:

TOTAL HR/LDG:

OPERATED BY:

BASED AT:

**INSPECTION REQUIREMENTS**

Carry out FPI of (13) cross tubes (external surface) as per ASTM E-1417-05 and the Dart QSI 038, Section 4.1.1 (on file at client) - parts delivered to HeathAir.

Qty (1) P/N D058-676-101 S/N B30250.

Qty(2) P/N D206-667-103 S/N's B30429 and B28979.

Qty (1) P/N D206-667-203 S/N B29635.

Qty(1) P/N D206-667-201 S/N B29098.

Qty (2) P/N D412-664-245 S/N's B31600 and B31598.

Qty (2) P/N D412-664-145 S/N's B31434 and B31152.

Qty (4) P/N D206-667-101 S/N's B30438, B28680, B29101 and B29099.

☐ RADIOGRAPHY☐ ULTRASONIC☒ PENETRANT☐ MAGNETIC PARTICLE☐ EDDY CURRENT**INSPECTION REPORT**

Fluorescent penetrant inspection was performed in accordance with the above requirements on (13) cross tubes.

Note: A Level 3 penetrant was substituted for the requested Level 2 (3 is more sensitive)  
Ardrox 970P25E Batch #04B503.

(13) cross tubes inspected. (10) PASSED / (3) FAILED.

Note: Failed items were serial numbers from above - B30250, B28680 and B29101.  
- tubes were marked in areas requiring rework.THE MAINTENANCE DESCRIBED ABOVE HAS BEEN PERFORMED IN ACCORDANCE WITH  
THE APPLICABLE STANDARDS OF AIRWORTHINESS

INSPECTED BY:

DATE

April 27, 2007.

INSPECTION  
STAMP(S)

CUSTOMER: Dart Aerospace

P.O. NUMBER

PO 00003644

ADDRESS: fax to 613-632-1053

CONTACT NAME:

Linda Lacelle

**CUSTOMER INFORMATION**

LABOUR

MATERIALS

TRAVEL EXPENSES

HOTEL EXPENSES

\$

GST

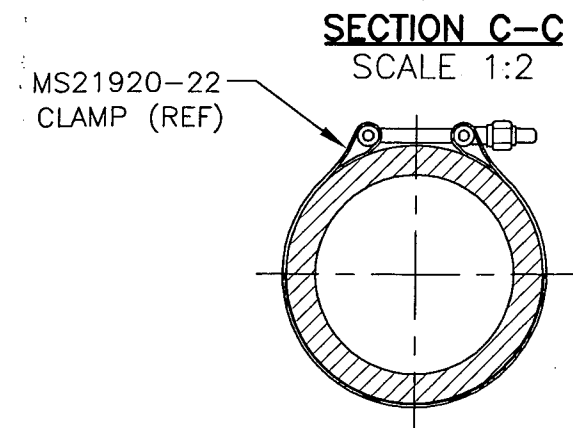
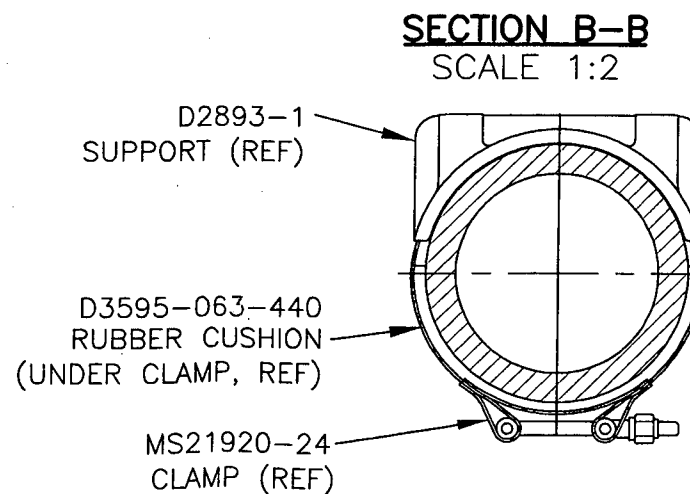
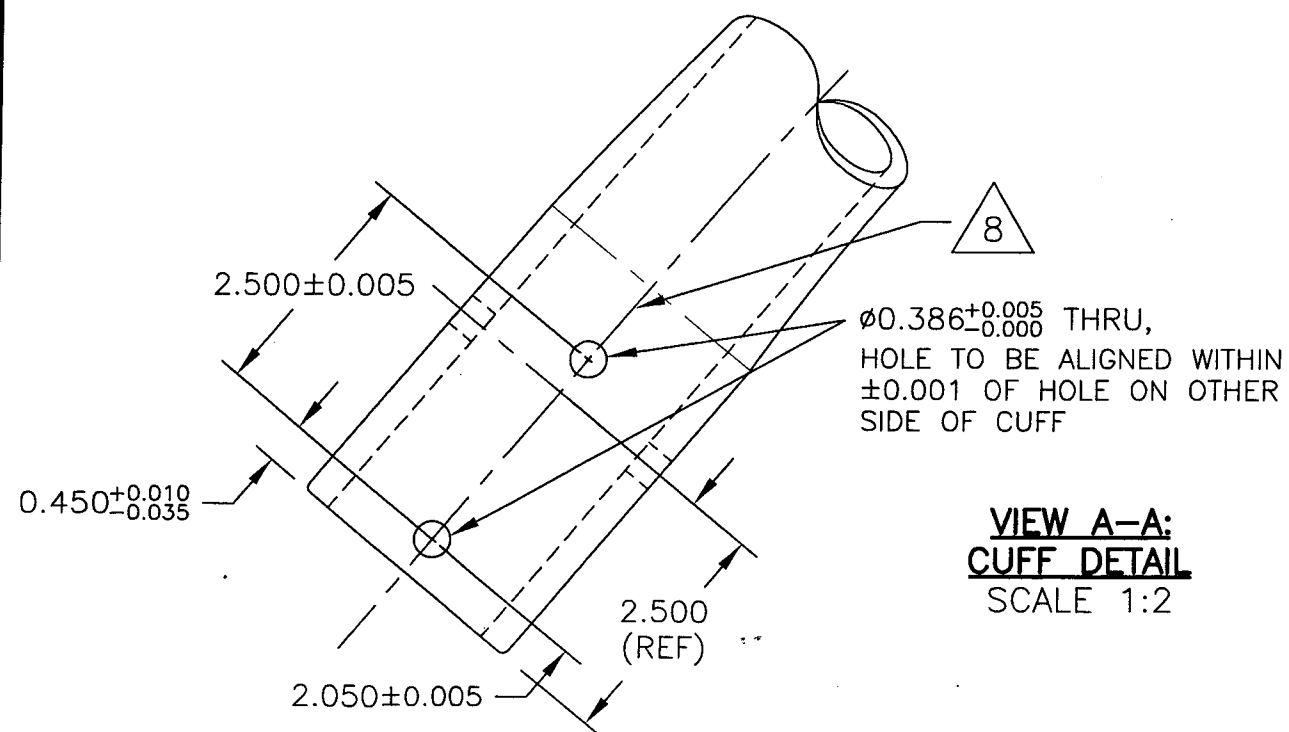
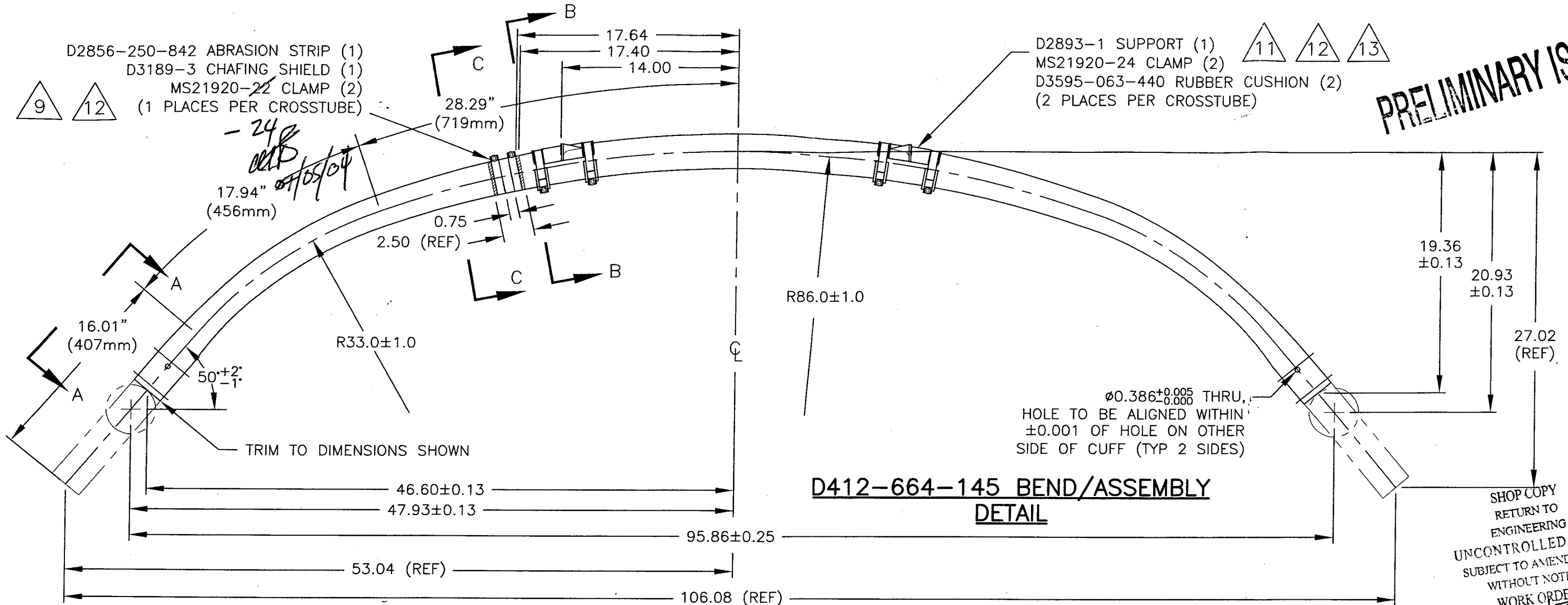
PST

INVOICE NO.

TOTAL \$

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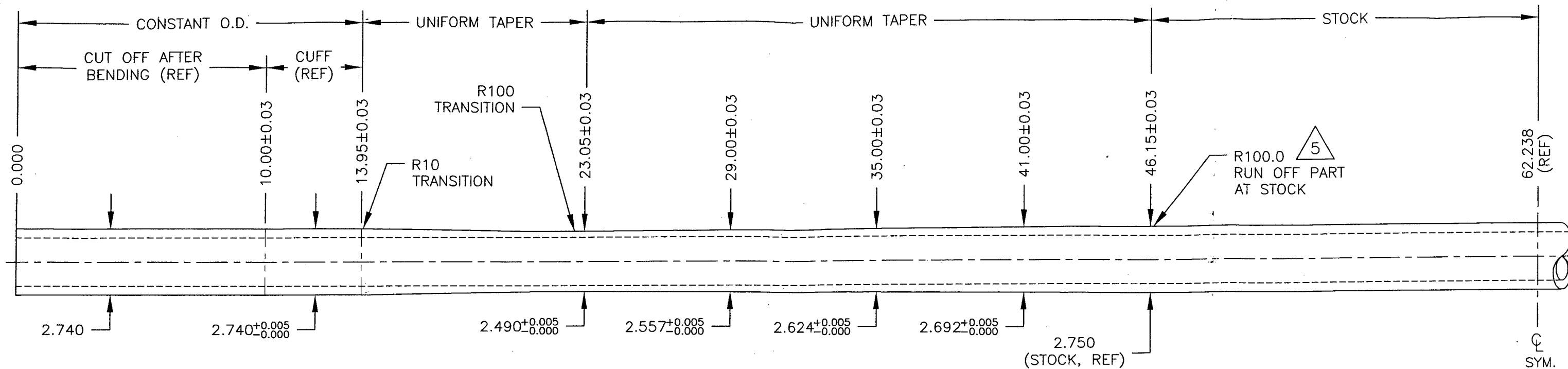
PRELIMINARY ISSUE



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DESIGN 90	DRAWN BY 90	<b>DART</b>	DART AEROSPACE LTD. HAWKESBURY, ONTARIO, CANADA
CHECKED H	APPROVED H	DRAWING NO. D412-664-145	REV. B SHEET 2 OF 3
DATE 07.03.01	TITLE CROSSTUBE (412 LOW-NARROW FWD)	SCALE 1:8	



# **D412-664-145 MACHINING DETAIL**

**PRELIMINARY ISSUE**

SHOP COPY  
RETURN TO  
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SUBJECT TO AMENDMENT  
WITHOUT NOTICE  
WORK ORDER  
NO. **31434**

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DATE <b>07.03.01</b>		TITLE <b>CROSSTUBE (412 LOW-NARROW FWD)</b>		REV. B SHEET 3 OF 3 SCALE 1:4